and +40° and the mean cloudiness varies from 2 in summer to 5 in winter. The annual rainfall amounts to 870 mm. Dr. Curt Hessen will be in charge of the observatory.

Both these stations are in latitude —31° 55′.

At the Observatory of Pulkowa, in latitude +59° 46′, a series of observations is in progress to supplement the observations at the stations of the International Geodetic Association and it is expected that the observatories at Leyden (latitude +52° 09′) and at Tokyo (latitude +35° 39′) will cooperate in this work.

PROFESSOR BJERKNES'S LECTURES.

THE lectures which Professor V. F. K. Bjerknes, of the University of Stockholm, will give at Columbia University during December are as follows:

FIELDS OF FORCE.

Friday, December 1, 1905, 4 to 6 P.M.: 'Elementary Investigation of the Geometric Properties of Hydrodynamic Fields' (with experiments).

Saturday, December 2, 1905, 10 to 12 A.M.: 'Elementary Investigation of the Geometric Properties of Hydrodynamic Fields' (with experiments).

Friday, December 8, 1905, 4 to 6 P.M.: 'Geometric Properties of Electromagnetic Fields According to Maxwell's Theory.'

Saturday, December 9, 1905, 10 to 12 A.M.: 'The Dynamic Properties of Electromagnetic Fields according to Maxwell's Theory.'

Friday, December 15, 1905, 4 to 6 P.M.: 'Transformation of the Hydrodynamic Equations to Forms which prove the Analogy of Hydrodynamic and Stationary Electromagnetic Fields.'

Saturday, December 16, 1905, 10 to 12 A.M.: 'Further Development and Discussion of the above Analogy.'

Friday, December 22, 1905, 4 to 6 P.M.: 'General Conclusions: Remarks on Methods of Research and of Instruction in Theoretical Physics.'

Saturday, December 23, 1905, 10 to 12 A.M.: 'Supplementary Lecture: The Hydrodynamic Fields of Force in the Atmosphere and the Sea; Discussion of the Fundamental Problem of Meteorology and Hydrography.'

The lectures will be open without charge to teachers and advanced students of physics.

PERMIAN GLACIATION IN SOUTH AFRICA.

THE following note of greeting has been addressed to Professor T. C. Chamberlin, of the Unversity of Chicago:

Members and guests of the British Association in South Africa, returning from a geological excursion, provided by the hospitality of the Natal government, send you greetings and wish you might have been with us to-day to see the Dwyka glacial formation (Permian) lying on a glaciated surface of Barberton (Archæan?) beds. The evidence of extensive glaciation, with *southward* movement of the vast ice sheet, is not to be doubted.

J. LOMAS, Liverpool.
G. N. MOLENGRAAFF, Johannesburg.
A. PENCK, Vienna.
B. HOBSON, Manchester.
DR. PR. BECK, Freiberg.
WILLIAM ANDERSON, Natal.
A. P. COLEMAN, Toronto.
F. G. KATZENSTEIN, Vryheid, Natal.
W. M. DAVIS, Cambridge, Mass.

VRYHEID, DISTR. NATAL,
Aug. 26, 1905.

SCIENTIFIC NOTES AND NEWS.

WE regret to learn that the condition of Dr. William R. Harper, president of the University of Chicago, is now very serious.

PROFESSOR EBERTH, director of the Pathological Institute in Halle and discoverer of the bacillus of typhoid fever, celebrated his seventieth birthday on September 21.

PROFESSOR FRANKLIN C. ROBINSON, head of the department of chemistry of Bowdoin College, has been elected president of the American Public Health Association, which will hold its annual meeting in January in the city of Mexico.

PROFESSOR WILHELM OSTWALD, of Leipzig, who, as we have already announced, will give courses in physical chemistry and philosophy at Harvard University during the first half of the present academic year, arrived at Cambridge on the second instant.

PROFESSOR J. A. HOLMES, of the University of North Carolina, is in Germany to investigate for the U. S. Geological Survey the use of brown lignite bricquettes for fuel and methods of protecting railway ties.

Dr. Wyssling, professor of electrical engineering in the Polytechnic Institute at Zurich, and Charles Wirth, also of Zurich, are in this country, to prepare a report on electrical railway development for the Swiss government.

The opening address to the students of the medical faculty of McGill University was delivered, on September 19, by Dr. Abraham Jacobi, emeritus professor at Columbia University. In the evening he was the guest of honor at a banquet.

During the coming January Mr. Bailey Willis, of the United States Geological Survey and the Carnegie Institution, will present a course of twelve lectures in the geological department of the University of Wisconsin on the subject of 'Continental Variations, with Special Reference to North America.'

Mr. E. E. Ellis has recently completed for the Division of Hydrology, U. S. Geological Survey, an investigation of the occurrence of groundwater in crystalline rocks of Connecticut. The results show that the supplies to be obtained from such rocks are much greater than is usually supposed, that the water is frequently under artesian pressure, and that its occurrence has a very definite relation to the presence of overlying drift.

Mr. Carl Schaeffer has just returned from southwestern Arizona, where he has been collecting insects for the last three months in the interest of the Museum of the Brooklyn Institute. His trip has been very successful and he has obtained many rare and some new species, the beetles being represented by the largest number of species and specimens. He secured a few specimens of the very rare tiger beetle, *Amblychila heroni,* only three or four specimens of which were previously known in collections. A few specimens of *Gymnetes cretacea,* were secured and two other species of the same genus new to the fauna of the United States. The collection of moths includes a number of rare species, some being heretofore represented by a single specimen and some that have recently been thrown out of lists, having been considered as wrongly attributed to our fauna. As soon as time permits, the material will be worked up and the results published.

The house at Ithaca occupied by the late Professor R. H. Thurston has been purchased by Mr. Hiram W. Sibley and given to the university as a residence for the director of Sibley College.

Professor DeWitt Bristol Brace, Ph.D. (Berlin), head of the department of physics in the University of Nebraska, and one of the leading physicists of the United States, died at his home in Lincoln, Nebr., on October 2, at 2 o'clock in the afternoon. He was in his forty-seventh year, and had just entered upon his nineteenth year of teaching in the University of Nebraska.

Baron Ferdinand von Richthofen, professor of geography in the University of Berlin, died on October 7, at the age of seventy-two years.

The death is also announced of Mr. George Bowdler Buckton, F.R.S., a leading British entomologist.

The International Tuberculosis Congress will hold its next meeting in Washington in 1908. At the closing session of the Paris Congress, on October 7, Professor Behring made a statement relative to his new curative principle for tuberculosis. According to a cablegram published in the daily papers he said: "In the course of the last two years I recognized with certainty the existence of a curative principle completely different from the antitoxic principle. This new curative principle plays an essential rôle in the operation of the immunity derived from my bovovaccine, which has proved effective against animal tuberculosis during the past four years. This curative principle reposes upon the impregnation of the living cells of the organism with a substance originating from tuberculose virus, which substance I designate 'T. C.'" Professor Behring then gave a technical description of how 'T. C.' was introduced into the cellular organism, and said it had already given marked results in the treatment of animals. He expressed the confident belief that his researches would permit similar curative results in man. He added that he was unable

to say how soon positive results would be obtainable, but he felt as certain that these results would be attained as when he first announced his discovery of a new method for treating diphtheria.

THE conference of the International Union for Cooperation in Solar Research was concluded on September 29, in New College, Oxford. It was resolved to accept the invitation of M. Janssen to meet at Meudon in September, 1907. Professors Schuster (chairman) and Hale were elected members of the executive committee. It was decided that the central bureau should be at the University of Manchester, and that the computing bureau should be at the University Observatory, Oxford, under the direction of Professor Turner. Committees were elected to deal with the following four subjects: (1) Standards of wavelength; (2) solar radiation; (3) cooperation in work with the spectro-heliograph; (4) cooperation in work on the spectra of sun-spots.

THERE will be a New York state civil service examination on October 28, to fill the position of assistant in botany in the science division of the Education Department with a salary of $600, for assistant in microscopy in the Buffalo Cancer Laboratory with a salary of $720, and of Bertillon clerk in the state prison with a salary of $900.

THE *Vingtième Siècle,* according to a Reuter telegram from Brussels, announces that, upon the initiative of the king of the Belgians, the polar explorers MM. Lecointe and Arktovski, of the *Belgica* expedition, Professor Nordenskiöld and Messrs. Bruce and Shackleton had a meeting after the sitting of the Mons Congress. The result of their deliberations was that a scheme for international expeditions to the North and South Poles was to be laid before the fifth section of the congress. It is proposed that these expeditions shall be organized through the good offices of the various governments interested in the scheme, and that monster subscriptions shall be opened for the purpose. The government of the king of the Belgians will play a great part in the organization of the expeditions. The polar explorers Sverdrup and Nansen (Norway), the Duke of the Abruzzi (Italy), Von Drygalski (Germany), Charcot (France), De Gerlache and Rakovitza (Belgium) and Cook and Peary (United States), who had been summoned to the meeting, were prevented from attending, but they wrote offering their support to the enterprise. Numerous subscriptions have already been received. A Reuter telegram from Mons states that the fifth section of the Congress on Polar Exploration has unanimously adopted a resolution in favor of the scheme.

The New York Medical Record states that the department of agriculture of the University of California has been engaged for several years in the study of the diseases of the insects that destroy various crops in this and other states, and in several instances have met with great success. Since July, Professor Clarke, assistant entomologist, had been studying a bacterial disease that completely exterminated the grasshoppers at Los Banos. The disease was of unknown origin and in the course of a month destroyed a countless army of the insects, after they had entirely devoured the alfalfa crop.

THE outlook for a profitable mining industry in the Philippine Islands is more hopeful to-day than it has been at any time since the American occupation, according to a brief report written by Mr. H. D. McCaskey, chief of the Mining Bureau, Philippine Islands, and published as an extract from the annual volume of the United States Geological Survey entitled 'Mineral Resources of the United States, 1904.' Mining development is now carried on in the provinces of Lepanto-Bontoc, Benguet, Pangasinan, Nueva Ecija, Bulacan, Rizal, Batangas, Tayabas, Camarines, Albay, Masbate, Cebu and Mindanao, and prospecting is being done in almost every island and province of the archipelago.

THE approaching session of the Royal Geographical Society, under the auspices of the new president, Sir George Goldie, promises, says the London *Times,* to be a busy one. It begins a week earlier than usual, and there will be four ordinary meetings before Christmas. The first meeting will be held on November 6, when the president will make a few introductory remarks, to be followed by a

paper on the mountains of Central Japan, by the Rev. Walter Weston. At the meeting on November 20, Mrs. Fanny Bullock Workman will give an account of the first exploration by herself and her husband of the Hoh-Lumba and Lobson glaciers, in the western Himalayas. On December 4, Mr. H. Weld Blundell will give a paper on the very interesting investigations he has been making on the Abai basin, in Abyssinia. On December 18, Mr. C. G. Seligman will give an account of the recent expedition to British New Guinea, under Major Daniels; the paper will be illustrated with cinematograph slides showing after a vivid fashion some of the customs of the natives. Among papers to be expected after Christmas are the following: 'Unexplored India,' by Colonel Sir T. H. Holdich; 'The Economic Geography of Australia,' by Professor J. W. Gregory, F.R.S.; 'Survey and Exploration in Seistan,' by Colonel A. H. McMahon, C.S.I.; 'Exploration in Tierra del Fuego,' by Captain R. Crawshay; 'Exploration in the East Tibet Borderlands,' by Lieutenant Filchner; 'Explorations in Bolivia and Peru,' by Baron E. Nordenskjöld; 'The Philippine Islands,' by Professor Alleyne Ireland; 'Northern Rhodesia,' by L. A. Wallace; 'The Geographical Influence of Water Plants in Chile,' by G. F. Scott Elliot; 'Maps of London,' by Laurence Gomme. Major St. Hill Gibbons will give a paper dealing with some of the results of his recent expedition to British East Africa in connection with the Zionist Association, and a paper on 'The Geography of the Spanish Armada' may be expected from the Rev. W. Spotswood Green. In addition to the ordinary evening meetings of the society, the research department, instituted about two years ago, holds frequent afternoon meetings for the discussion of special subjects in scientific and applied geography. The scheme for the investigation of the changes which have taken place in the North Sea Coast region during historical times will be further considered, and it is hoped active steps will be instituted for carrying out the inquiry. Sir Clements Markham will introduce the question of 'The Next Great Arctic Discovery,' in which he will advocate detailed investigation of the unknown region lying between Prince Patrick Island and the New Siberian Islands. Among other subjects to be brought before this department of the society will be the results of an investigation into the areas of the orographical regions of England and Wales, by Dr. A. J. Herbertson, reader in geography at Oxford University. It is expected that the visit of the British Association to South Africa will have furnished the geographical members with certain problems in their subject suitable for discussion at the research department.

The present is an especially favorable time to study the geologic structure of Greater New York, for never before in the earth's history has there been such a focus for engineering enterprises as is now found within the 50 or more square miles included within Manhattan Island. These enterprises have together furnished more than 35 sections across the rivers which form the water front of the island. Many of them reveal the nature of the subjacent rock, and a number of them give nearly complete section across it. In view of the rapid work of the engineers, it is important that observations be made and recorded at once lest the opportunity be forever lost. Bulletin 270 of the United States Geological Survey, which is entitled 'The Configuration of the Rock Floor of Greater New York,' is, therefore, an especially timely study. Mr. William Herbert Hobbs, the author, calls further attention to the fact that the present is a particularly favorable time for geologic observation in this vicinity, because of the enormous increase in the value of real estate upon Manhattan Island. It is resulting in a paring down of all rock masses which project above the general level in order to make room for business blocks and apartment houses. The greater number of the rock exposures described by Dana and other early observers are now no longer seen, and those still uncovered by blocks and pavements will in a very few years have disappeared from view. After reviewing briefly the structural geologic studies made in the New York City area by earlier writers, Mr. Hobbs states that too little weight, in his opinion, has been ac-

corded by recent observers to the importance of normal faulting in determining the structure of Manhattan Island. He describes a number of additional fault planes which have recently been located. The purpose of his investigation is to determine the depth and the nature of bed rock beneath Greater New York, through the medium of wells and borings, the numerous bridge and tunnel sections, the government dredgings, the reefs in mid-channel, etc. It is believed that this work will aid not only in the solution of the geological problems of the area, but will be of assistance to those engaged in the great engineering enterprises now going forward on the island, as well as to architects, contractors and many others.

THE Iron and Steel Institute of Great Britain met at Sheffield on September 26, when Mr. R. A. Hatfield gave the presidential address. According to the abstract in the London *Times* he dwelt upon the large and important position which Sheffield had taken in the development of steel and its applications. As they all knew, Chaucer in 1460 spoke of Sheffield thwitels, and these still formed a not unimportant branch of Sheffield products. In the interesting works of that important French metallurgist of the eighteenth century, Jars, Sheffield was then recognized as playing a very important part in metallurgy. Sheffield had indeed been the cradle of modern steel industry, and its development had been largely due to the work of Sheffield men. They all knew how much Huntsman did, and it was a special pleasure to see there that day two of his descendants. Coming nearer to their own times, whilst Bessemer was not a Sheffield man, the first practical developments of his process might be truly said to have occurred there, and were carried out by Sheffield men. Sir John Brown, with his great foresight, saw the importance this process would occupy, and his firm turned out some of the highest quality material for rails probably yet produced. He had now in his possession an interesting photograph representing rails and bars rolled by Sir John Brown at the Atlas Works from the first rails made commercially of Bessemer's steel. This photograph had been kindly sent to him by the son of Mr. Bragge, who was then one of Sir John's partners. On it there occurred the following remarkable inscription, personally written by Mr. Bragge forty-four years ago: "This photograph was taken from the first rails ever made commercially in England of cast steel, produced by Bessemer's process, and when steel rails have superseded iron, as they certainly will do in the course of time, this picture will record who first had courage to introduce them to the world. May 1st, 1861." A remarkable prediction which had indeed come to pass. Mr. W. D. Allen, of Bessemer's firm in Sheffield, also largely helped in the practical development of this method of steel making, and the inimitable Holly, from whose work the enormous development of Bessemer steel in America largely arose, did not go to South Wales or elsewhere, but came to Sheffield to be initiated, so that Sheffield might be rightly said to have taught America how to make steel rails used in those lines of communication that had entirely altered the whole face of the vast Transatlantic continent. In the same manner as regards the Siemens's process, firms such as Vickers's were largely instrumental in leading to the more rapid development and perfection of this method of producing steel. Then, too, they saw men such as Mark Firth, William Jessop, Charles Cammell and others who were indeed pioneers, and from whose labors the world to-day found so great benefit. On the scientific side they had, amongst others, Dr. Sorby, who had rendered invaluable service to metallurgy by his initiation, as far back as 1857, of methods of examining the micro-structure of metals, from which they to-day were obtaining much valuable information. To-day Sheffield had probably the largest industrial army of any city devoted to the production and working of steel, 30,000 men or more being so employed. The work done by the institute spoke for itself, and as a sign of prosperity, he might say that they had that day elected something like 150 new members, bringing the roll-call to the satisfactory grand total of no less than 2,200 members.